United States Patent [19]

Taniguchi et al.

[11] **Patent Number: 4,970,856**

[45] **Date of Patent: Nov. 20, 1990**

[54] **BOBBIN SUPPLY SYSTEM FOR SPINNING FRAMES**

[75] Inventors: **Kaoru Taniguchi**, Ishikawa; **Motomi Ohta**, Kanazawa, both of Japan

[73] Assignee: **Kabushiki Kaisha Murao & Company**, Kanazawa, Japan

[21] Appl. No.: **433,909**

[22] Filed: **Nov. 9, 1989**

[30] **Foreign Application Priority Data**

Nov. 10, 1988 [JP] Japan 63-284966

[51] **Int. Cl.**[5] **D01H 9/18**; D01H 9/00; B65H 67/06

[52] **U.S. Cl.** ..... **57/281**; 57/264; 57/276; 242/35.5 A

[58] **Field of Search** ..... 57/264–266, 57/274, 276, 281; 242/35.5 R, 35.5 A

[56] **References Cited**

U.S. PATENT DOCUMENTS

3,828,682	8/1974	Klein	57/281 X
4,041,686	8/1977	Inaba et al.	57/281
4,683,713	8/1987	Matsui et al.	57/281
4,843,808	7/1989	Ruge et al.	57/264

Primary Examiner—John Petrakes
Attorney, Agent, or Firm—Oblon, Spivak, McClelland, Maier & Neustadt

[57] **ABSTRACT**

A bobbin transport system for spinning frames for supplying bobbins from bobbin reservoirs to spinning frames in a spinning mill. The spinning frames are divided into dedicated machine groups and a common machine group or groups. Bobbins are supplied to the dedicated machine groups by way of a main transport path and/or a sub transport path, and a communicating transport path for transferring bobbins from the sub transport path to the main transport path is provided for each of the spinning frames of the common machine group or groups. The bobbin transport system for spinning frames makes it possible to change the allotment of numbers of spinning frames for different types of yarns to be set for the common machine group or groups and to distribute different types of bobbins accurately to predetermined spinning frames thereby to enable production of several articles by small quantities without deteriorating the availability factor of the entire spinning frames.

8 Claims, 3 Drawing Sheets

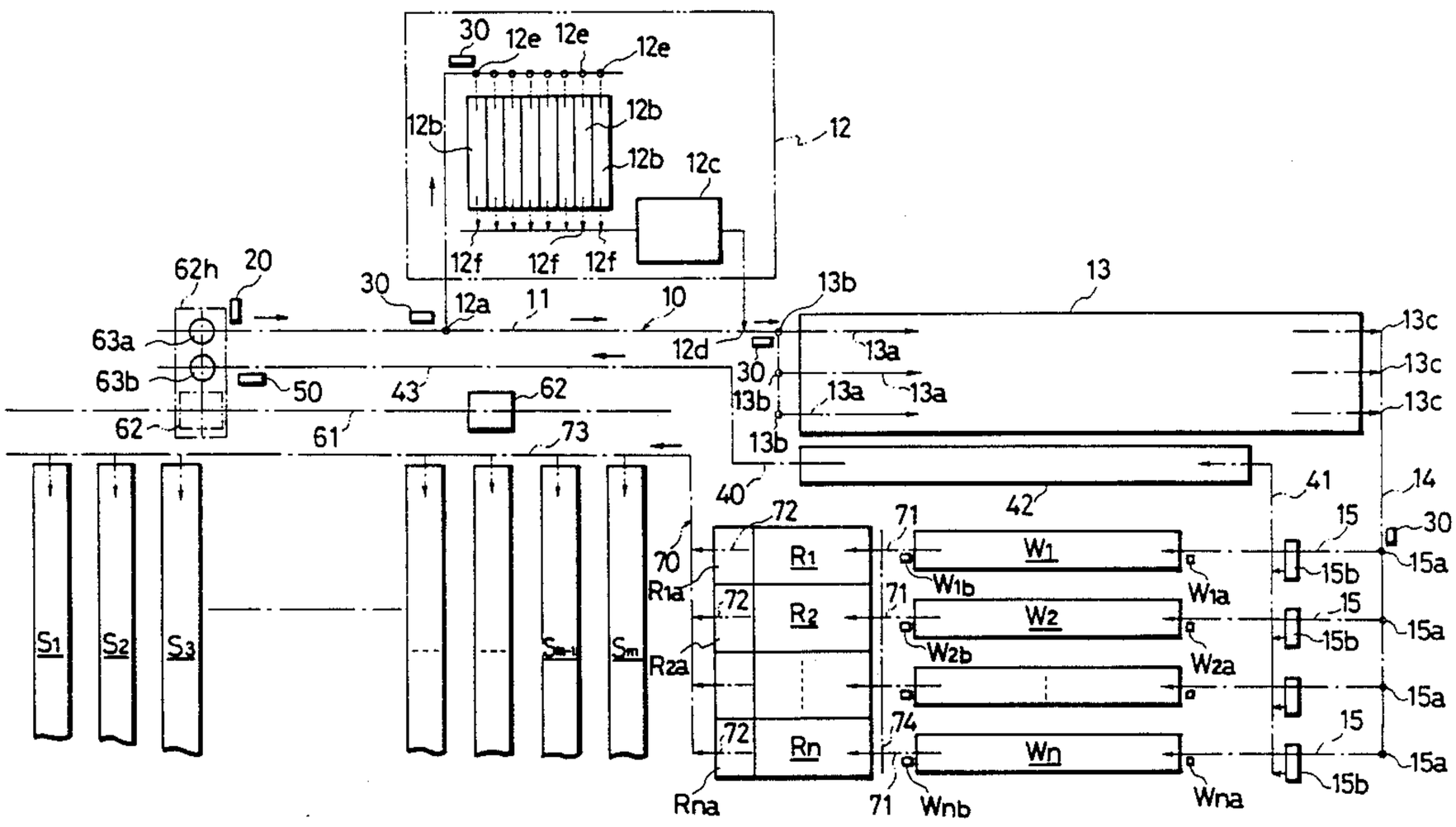
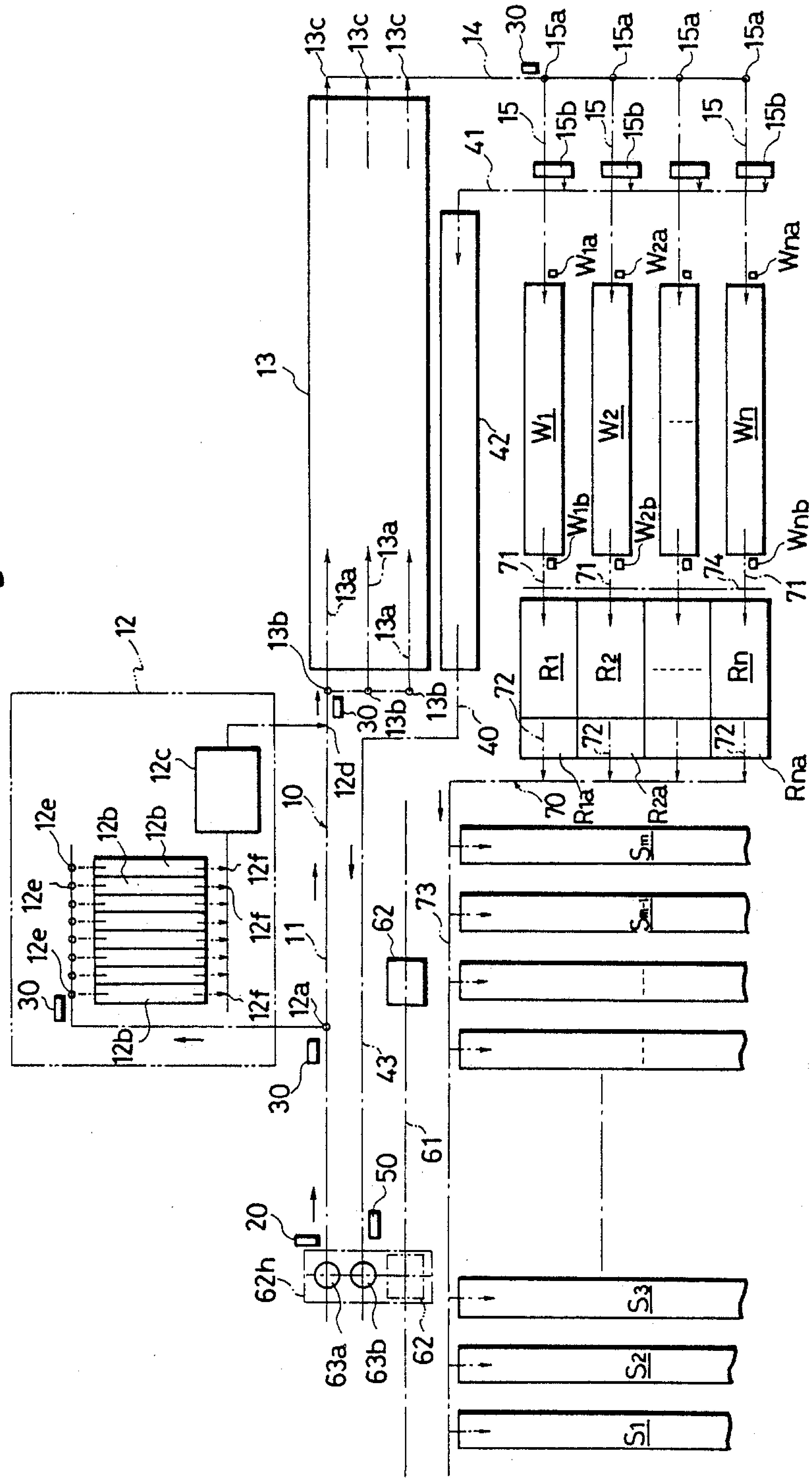


Fig. 1


13c
13c
13c
14
30
15a
15a
15a
15a
15
15b
15
15b
15
15b
41
W1a
W2a
Wna
13
42
W1
W2
Wn
W1b
W2b
Wnb
13a
13a
13a
71
71
74
71
12
13b
R1
R2
Rn
72
72
72
30
13b
13b
40
12c
12d
10
70
R1a
R2a
Rna
12e
12b
12b
12e
12e
12f
12f
12f
11
Sm
Sm-1
62
73
30
12a
12b
30
43
61
50
20
62h
63a
63b
62
S3
S2
S1

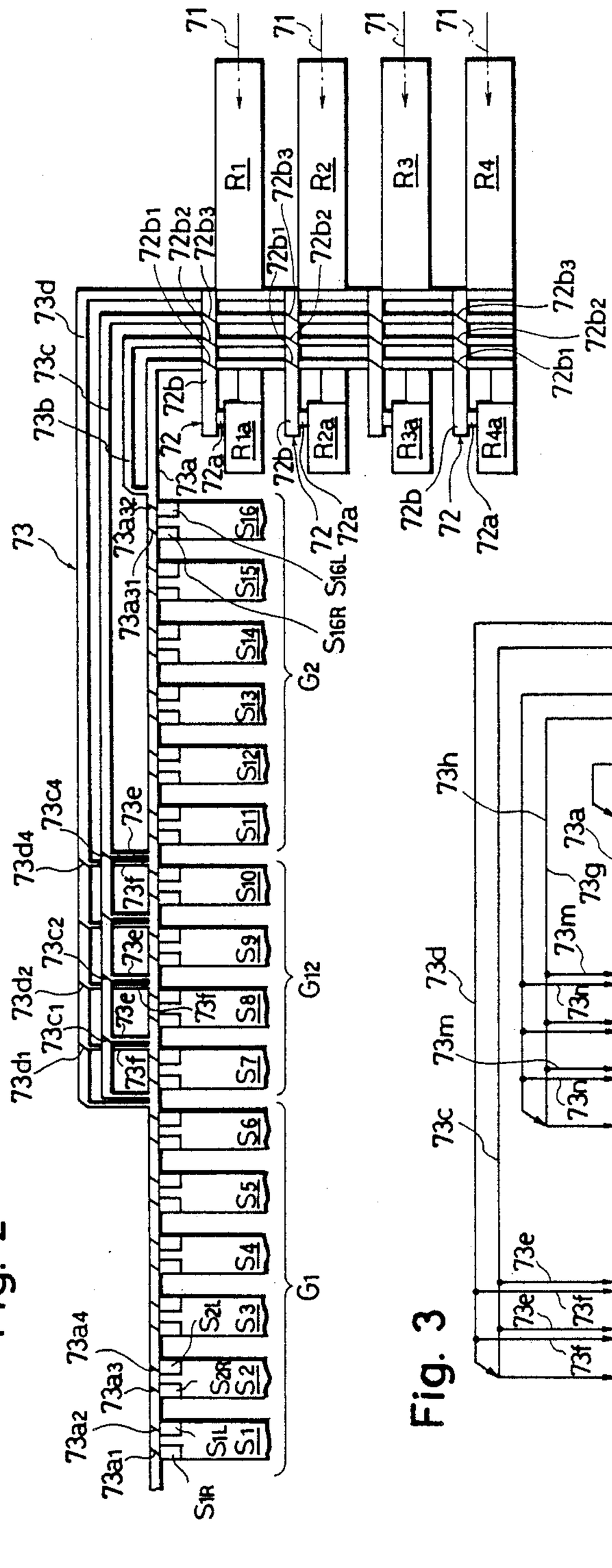

71
R1
R2
R3
R4
72b1
72b2
72b3
72
72a
72b
R1a
R2a
R3a
R4a
73
73a
73a1
73a2
73a3
73a4
73a31
73a32
73b
73c
73c1
73c2
73c4
73d
73d1
73d2
73d4
73e
73f
S1R
S1L
S1
S2R
S2L
S2
S3
S4
S5
S6
S7
S8
S9
S10
S11
S12
S13
S14
S15
S16
S16R
S16L
G1
G12
G2
73h
73m
73n
Sm
73g
G3
G23

Fig. 2

Fig. 3

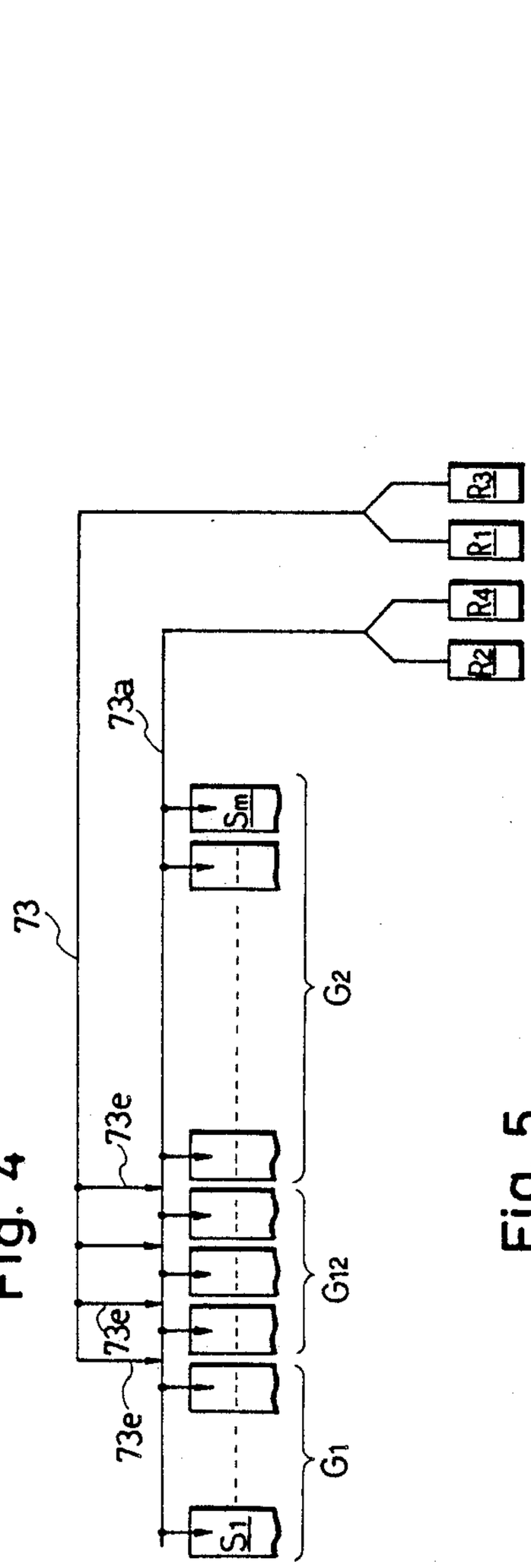


Fig. 4

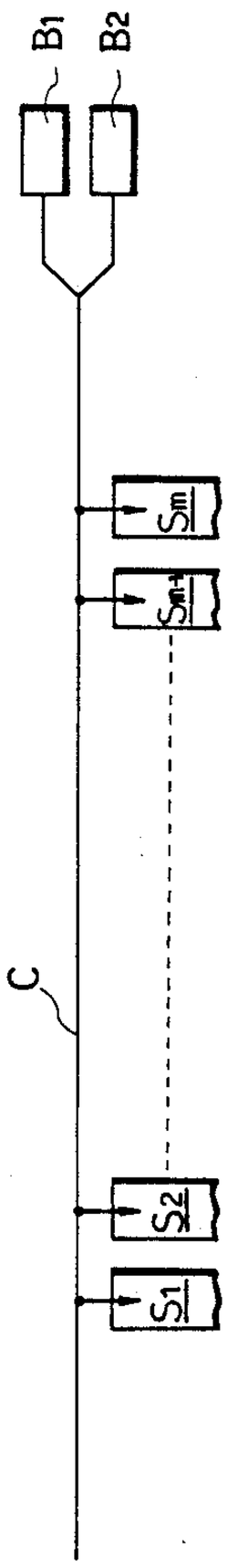


Fig. 5

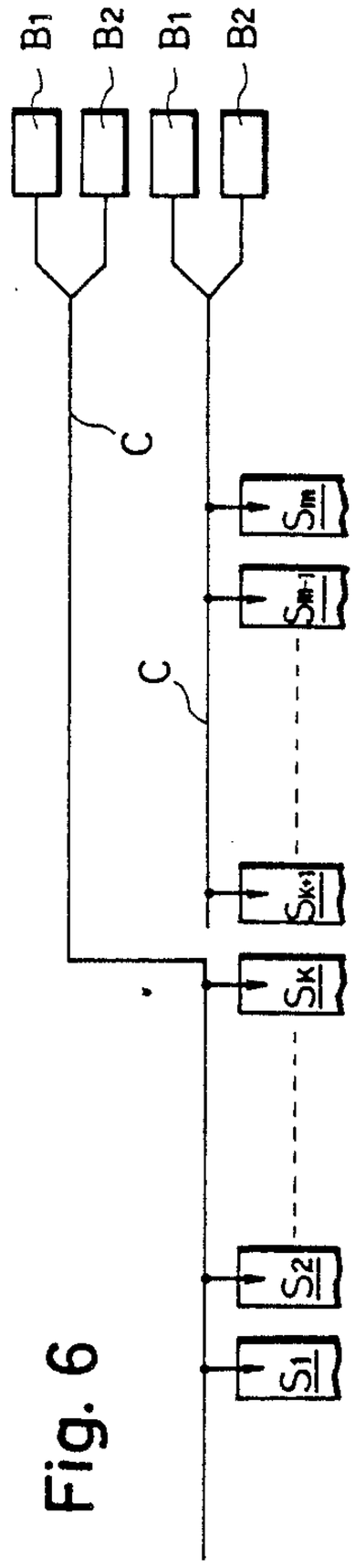


Fig. 6

BOBBIN SUPPLY SYSTEM FOR SPINNING FRAMES

FIELD OF THE INVENTION

This invention relates to a bobbin supply system for spinning frames for supplying a predetermined bobbin precisely to a predetermined spinning frame in accordance with a type of a yarn to be set on the spinning frame when a bobbin frame which a yarn has been unwound by a winder is to be returned to the spinning frame side.

BACKGROUND OF THE INVENTION

In a spinning mill, bobbins of cops unwound by a winder are normally returned to the spinning frame side in order to use them again. To this end, various bobbin supply systems have been proposed and put into practical use. Further, it is a very popular means to differentiate bobbins to be supplied to spinning frames from each other in accordance with types of yarns to be set on the spinning frames, for example, to differentiate such bobbins in color, to facilitate discrimination of types of yarns of cops for a next step.

In this manner, it is necessary for a bobbin supply system to supply a predetermined bobbin precisely to a predetermined spinning frame, and a simplest one of conventional bobbin supply systems for realizing such function is constituted such that, for example, a pair of bobbin supply devices **B1** and **B2** and a plurality of spinning frames **S1**, **S2**, . . . , Sm are communicated with each other by way of a single transport passage C (FIG. **5**). Here, each of the bobbin supply devices **B1** and **B2** is constituted such that it forwards a bobbin of a predetermined type into the transport passage C in response to a bobbin requesting signal from a predetermined spinning frame **S1** (i=1, 2, . . . , m). Such bobbin requesting signal includes information representative of the spinning frame Si and information which specifies a type of a bobbin requested. It is to be noted that a bobbin change-over mechanism not shown which operates in response to a bobbin requesting signal is incorporated at each of branch points at which the transport passage C branches to the individual spinning frame Si. Thus, a bobbin transported from the upstream side of the transport passage C can be sent into a predetermined spinning frame Si by means of the corresponding change-over mechanism.

Further, m spinning frames **S1**, **S2**, . . . , Sm may be divided into two groups individually including k spinning frames and m-k simming frames, and a transport passage C and a pair of bobbin supply devices **B1** and **B2** may be provided similarly as in the system shown in FIG. **5** for each of the groups (FIG. **6**). Such arrangement is advantageous in that the availability factor of the entire spinning frames can be improved because a bobbin supplying operation can be performed simultaneously to two spinning frames Si and Sj ($1 \leqq i \leqq k$, $k+1 \leqq j \leqq m$) which belong to the different groups from each other.

The prior art, however, has a problem that it cannot always be adapted precisely for a demand for lot production of many articles by small quantities which is conducted commonly in recent spinning mills. In particular, since normally the doffing period is different depending upon a type of yarn to be set on a spinning frame, in case various types of yarns are handled in the prior art arrangement shown in FIG. **5**, there is the

possibility that such an opportunity that a spinning frame having a comparatively short doffing period is rendered inoperative for a bobbin supplying operation for another spinning frame having a comparatively long doffing period may be increased, which will significantly deteriorate the overall availability factor.

On the other hand, while the overall availability factor can be improved as compared with the prior art arrangement shown in FIG. **5** if yarns of the same type are worked on spinning frames which belong to the same group, there is a problem that, since the number of spinning frames involved in each group is fixed, the arrangement cannot cope effectively with a variation in number of production lots of each yarn type.

OBJECT OF THE INVENTION

The present invention has been made in view of such circumstances as described above, and it is an object of the present invention to provide a bobbin supply system for spinning frames wherein the numbers of spinning frames on which yarns of different types are to be set can be changed at any time in accordance with a variation in number of production lots of yarns of different types and predetermined bobbins conforming to the yarn types to be set on the individual spinning frames can be supplied appropriately with certainty so that a plurality of types of yarns can be produced simultaneously by appropriate lot numbers without deteriorating the availability factor of the spinning frames.

SUMMARY OF THE INVENTION

In order to attain the object, according to the present invention, a bobbin supply system is constituted such that said spinning frames are divided into a plurality of dedicated machine groups each for working yarns of a fixed type and a common machine group disposed between each adjacent ones of said dedicated machine groups for working yarns of a selected one or ones of different types, and that said system comprises a main transport path capable of supplying bobbins to all of said dedicated machine groups and the common machine group or groups from the upstream side toward the downstream side, a sub transfer path joined to said main transport path at a boundary position between each of the common machine group or groups and an adjacent one of said dedicated machine groups on the downstream side of the common machine group for supplying bobbins to the spinning frames on the downstream side of the position, and a communicating transport path provided for each of the spinning frames of the common machine group or machine groups adjacent the boundary position or positions for establishing communication between said sub transport path and said main transport path.

With the bobbin supply system, bobbins are supplied by way of the main transport path at least to the spinning frames which belong to the most upstream side one of the dedicated machine groups while bobbins are supplied to the spinning frames which belong to any other dedicated machine groups by way of the sub transport path or main transport path corresponding to the dedicated machine group. On the other hand, bobbins can be supplied to the spinning frames which belong to any one of the common machine group or groups by way of the same route to that for an adjacent one of the dedicated machine groups on the upstream side of the common machine group. In this manner, the

spinning frames which belong to each of the dedicated machine groups and the spinning frames which belong to an adjacent one of the common machine group or groups on the downstream side of the dedicated machine group form a group, and yarns of a same type are set for each group in operation.

When the numbers of the spinning frames which belong to the individual groups are to be changed, the communicating transport paths are used. In particular, when a certain one or ones of the spinning frames which belong to a common machine group are separated from an adjacent one of the dedicated machine groups on the upstream side and then combined with the spinning frames which belong to another adjacent one of the dedicated machine groups on the downstream side so as to form a new group, the communicating transport path corresponding to the most upstream side one of the certain spinning frame or frames is used to change to the position at which the communicating path is communicated with the main transport path. Consequently, the number of spinning frames which belong to each group can be changed by changing separation of the spinning frames of a common machine group.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a diagrammatic representation of an entire bobbin supply system showing an embodiment of the present invention;

FIG. **2** is a diagrammatic representation showing details of part of the system shown in FIG. **1**;

FIG. **3** is a diagrammatic representation schematically showing another embodiment of the present invention;

FIG. **4** is a similar view but showing a further embodiment of the present invention; and

FIGS. **5** and **6** are similar views but showing exemplary ones of conventional yarn supply systems.

DETAILED DESCRIPTION OF THE INVENTION

In the following, different embodiments of the present invention will be described with reference to the drawings.

Referring to FIG. **1**, a bobbin supply system for spinning frames includes, in combination, bobbin reservoirs Rj (j=1, 2, . . . , n) interposed between spinning frames Si (i=1, 2, . . . , m) arranged in a row and winders Wj (j=1, 2, . . . , n) and corresponding to the winders Wj, and a bobbin transport conveyor **70**. It is to be noted that a cop transport system from the spinning frames Si to the winders Wj is also shown in FIG. **1**.

The cop transport system is constituted such that it accommodates cops wound up on the spinning frames Si into predetermined cop magazines and transports them to the winders Wj by way of a cop transport conveyor system **10** which includes a forward conveyor **11**, a working device line **12** which forms a bypass to the forward conveyor **11**, a stock line **13**, a communicating conveyor **14** which forms an exit passage from the stock line **13**, and branch conveyors **15** which branch from the communicating conveyor **14** to the individual winders Wj.

A cop boxing device **62** is disposed on the out end side of the spinning frames Si and adapted to move back and forth by itself on a guide rail **61**. The cop boxing device **62** is constituted such that it can stop on the out end side of a predetermined spinning frame Si and accommodates cops doffed from the spinning frame Si in an orderly fashion into a cop magazine, and then transport the cop magazine to a home position **62***h* provided on the guide rail **61**.

The cop boxing device **62** can, at the home position **62***h* thereof, discharge the cop magazine (hereinafter referred to only as magazine), in which the cops are accommodated, onto a turntable **63***a* which forms a starting end portion of the cop transport conveyor system **10**. Meanwhile, another turntable **63***b* is provided at a last end of an empty magazine conveyor system **40** which is disposed in such a manner as to reach the home position **62***h*, and the cop boxing device **62** can carry thereon an empty cop magazine (hereinafter referred to only as empty magazine) which has come to the turntable **63***b*, thereby to make preparations for an accommodating operation for cops from another spinning frame Si.

The working device line **12** branches from the forward conveyor **11** at a branching point **12***a* and, passing a plurality of standby lines **12***b* and a working device **12***c* which performs a setting process of a cop, for example, by steam, joins the forward conveyor **11** at a joining point **12***d*. The working device **12***c* can make batch processing of a plurality of occupied magazines while each of the standby lines **12***b* can store in a row thereon at least a number of occupied magazines corresponding to one batch of the working device **12***c*. A branch point **12***e* and a joining point **12***f* are formed on the upstream side and the downstream side, respectively, of each of the standby lines **12***b*.

On the other hand, the stock line **13** includes a plurality of rows of conveyors **13***a* each having a branch point **13***b* and a joining point **13***c* on the upstream side and the downstream side thereof, respectively. Each of the stock conveyors **13***a* can store thereon, for example, a number of occupied magazines sufficient to absorb a difference in working capacity between the spinning frames Si which operate continuously day and night and the winders Wj which operate only in the daytime.

The branch conveyors **15** branch from the communicating conveyor **14** individually by way of branch points **15***a*. A cop feed device **15***b* is disposed intermediately of each of the branch conveyors **15** and operates to discharge cops from an occupied magazine transported thereto and forward only a cop into a winder Wj in response to a cop requesting signal from the winder Wj. In particular, on each of the branch conveyors **15**, an occupied magazine is transported to the cop feed device **15***b*, but only cops are transported from the cop feed device **15***b* to the winder Wj. Yarn end pickup devices Wja (j=1, 2, . . . , n) for picking up an end of a yarn of a cop are disposed at entrance ends of the winders Wj.

Empty magazines discharged from the cop feed devices **15***b* are fed back to the home position **62***h* by way of the empty magazine conveyor system **40** which includes a connecting conveyor **41**, an empty magazine stock line **42** and a return conveyor **43**. The empty magazines are thus used again by means of the cop boxing device **62**.

A tab setter **20** is disposed in or adjacent the home position **62***h* of the cop boxing device **62** which makes the starting point of the cop transport conveyor system **10**. The tab setter **20** is provided to set and store a code (hereinafter referred to as tab code) indicative of a type of code accommodated in a cop magazine into a tab device provided on the cop magazine. Such tab code setting and storing means may be any one of, for exam-

ple, mechanical, electronic, magnetic or some other means.

A tab reader **30** is disposed on the upstream side of each of the branch points **12***a*, **12***e*, **13***b* and **15***a* intermediately of the cop transport conveyor system **10**.

Each of the tab readers **30** is provided to read a tab code set and stored for each cop magazine by the tab setter **20**, discriminate a type of yarns accommodated in the cop magazine and selectively transport occupied magazine to a predetermined destination. For example, the tab reader **30** on the upstream side of the branch point **12***a* can discriminate whether an occupied magazine transported thereto on the forward conveyor **11** must necessarily advance into or should bypass the working process line **12**. Meanwhile, the tab reader **30** on the upstream side of the branch points **13***b* can select one of the stock conveyors **13***a* in the stock line **13** for each type of yarns of cops in an occupied magazine, and consequently, the stock conveyors **13***a* can individually store thereon occupied magazines selected for individual types of yarns. Further, the tab reader **30** on the upstream side of the branch lines **15***a* can select a specific winder Wj in accordance with an individual type of a yarn.

A tab clearer **50** is disposed intermediately of the return conveyor **43** which forms part of the empty magazine conveyor system **40**. The tab clearer is provided to clear the tab code set in the tab device of an empty magazine to assure the reliability of a resetting operation of a tab code by the tab setter **20**.

A cop supplied to a winder Wj from a corresponding cop feed device **15***b* is at first subjected to a yarn end picking up operation by the yarn end pickup device Wja of the winder Wj and is then set for working on the winder Wj on which it is rewound, for example, into a cheese-like configuration, whereafter it is discharged to a next step by means of a conveyor system not shown. On the other hand, an empty bobbin (hereinafter referred to only as bobbin) from which a yarn has been unwound is checked that it has no remaining yarn thereon by means of a remaining yarn detecting device Wjb (j=1, 2, . . . , n) disposed at an exit end of the winder Wj, and then the bobbin is discharged onto a communicating conveyor **71** which makes part of the bobbin transport conveyor system **70**.

The bobbin transport conveyor system **70** includes communicating conveyors **71**, connecting conveyors **72** and a returning conveyor **73**.

The communicating conveyors **71** individually communicate the winders Wj with the bobbin reservoirs Rj. A transverse conveyor **74** extends transversely to the communicating conveyors **71** so that any one of the winders Wj can communicate with an arbitrary one of the bobbin reservoirs Rj by way of the communicating conveyors **71** and the transverse conveyor **74**.

The bobbin reservoirs Rj are provided to temporarily store therein bobbins discharged from the winders Rj and have bobbin loaders Rja (j=1, 2, . . . , n) provided therefor for transferring accumulated bobbins individually to the connecting conveyors **72**.

The connecting conveyors **72** are provided to transfer bobbin loaders Rja to the returning conveyor **73**. Each of the connecting conveyors **72** includes, as shown in FIG. **2**, a bucket conveyor **72***a* for successively scooping up and feeding out bobbins from the corresponding bobbin loader Rja, and a transfer conveyor **72***b* for transferring a bobbin from the bucket conveyor **72***a* to the returning conveyor **73**. Each of the connecting conveyors **72** has change-over mechanisms **72***b***1**, **72***b***2**, . . . incorporated therein for selectively transporting bobbins to a main transport path **73***a*, a spare main transport path **73***b*, a sub transport path **73***c* and a spare sub transport path **73***d* which generally constitute the returning conveyor **73**.

The returning conveyor **73** supplies bobbins from within the bobbin reservoirs Rj to the spinning frames Si by way of the bobbin loaders Rja and the connecting conveyors **72**.

The returning conveyor **73** may be constituted, for example, such that it includes an endless drive belt for receiving and moving empty bobbins in a laid down condition and a pair of side walls provided uprightly on the opposite side of the endless belt, and empty bobbins are laid successively in a row on the endless drive belt to transport the empty bobbins.

It is to be assumed here that there are up to 16 spinning frames Si (i=1, 2, . . . , m, m=16), and the six spinning frames **S1**, **S2**, . . . , **S6** on the downstream side in the bobbin supplying direction form a first dedicated machine group **G1**; the four spinning frames **S7**, **S8**, **S9**, **S10** on the upstream side of the first dedicated machine group **G1** form a common machine group **G12**; and the six spinning frames **S11**, **S12**, . . . , **S16** on the most upstream side form a second dedicated machine group **G2**. It is to be noted that each of the spinning frames Si has a pair of spindles not shown on the right- and left-hand sides thereof and further has a pair of bobbin receiving devices SiR and SiL (i=1, 2, . . . , m) for the right- and left-hand sides provided for the spindles. Further, FIG. **2** shows as up to four bobbin reservoirs Rj and four bobbin loaders Rja are used (n=4).

The main transport path **73***a*, spare main transport path **73***b*, sub transport path **73***c* and spare sub transport path **73***d* individually serve as conveyor lines for supplying bobbins from the transfer conveyors **72***b* to the spinning frames Si. The main transport path **73***a* is disposed very closely to the out end sides of the spinning frames Si and extend over the full extent from the spinning frame **S16** to the spinning frame **S1** so that it may supply bobbins to all of the spinning frames Si. Further, the main transport path **73***a* has change-over mechanisms **73***a***1**, **73***a***2**, . . . , **73***a***32** provided therefor corresponding to the bobbin receiving devices SiR and SiL of the individual spinning frames Si. The spare main transport path **73***b* joins the main transport path **73***a* on the upstream side very near to the spinning frame **S16** on the most upstream side.

The sub transport path **73***c* and the spare sub transport path **73***d* are arranged in a juxtaposed relationship to each other and both join the main transport path **73***a* on the upstream side very near to the most upstream side one **S6** of the spinning frames **S1** to **S6** which belong to the first dedicated machine group **G1**. Meanwhile, a communicating transport path **73***e* for communicating the sub transport path **73***c* with the main transport path **73***a* and a spare communicating transport path **73***f* for communicating the spare sub transport path **73***d* with the main transport path **73***a* are disposed on the upstream side very near to each of the spinning frames **S7** to **S10** which belong to the common machine group **G12**, and change-over mechanisms **73***c***1**, **73***c***2**, . . . and **73***d***1**, **73***d***2**, . . . corresponding to the communicating transport paths **73***e* and spare communicating transport paths **73***f* are incorporated in the sub transport path **73***c* and the spare sub transport path **73***d*, respectively. Each of such change-over mechanisms may include, for ex-

ample, an opening and closing plate which is quickly opened or closed by an air cylinder or an electric actuator in response to an opening/closing control signal.

It is to be noted that each of the change-over mechanisms is provided to make a changing over operation so that a bobbin transported by the main transport path may be sent into a predetermined spinning frame, and where the spinning frames are of the opposite side type having spindles on the opposite right- and left-hand sides thereof, such change-over mechanisms are provided correspondingly on the opposite sides of the spinning frames so that bobbins may be supplied to the opposite sides of the spinning frames.

The bobbin supply system for spinning frames having such a construction as described above operate in the following manner.

It is assumed here that the spinning frames **S1** to **S6** which belong to the first dedicated machine group **G1** form a first group while the spinning frames **S7** to **S16** which belong to the common machine group **G12** and the second dedicated machine group **G2** form a second group, and the spinning frames are working with different types of yarns set thereon. In this instance, two different types of bobbins for different types of yarns are discharged from the winders Wj and individually thrown into the different bobbin reservoirs **R1** and **R2** by way of the corresponding communicating conveyors **71** and the transverse conveyor **74**. Thereupon, the other bobbin reservoirs **R3** and **R4** may receive yarns of the same types with the bobbin reservoirs **R1** and **R2** or otherwise may be left at rest. It is assumed here, however, that bobbins to be used on the spinning frames Si (i=1, 2, . . . , 6) which belong to the first group are thrown into the bobbin reservoir **R1** while bobbins to be used on the spinning frames Si (i=7, 8, . . . , 16) which belong to the second group are thrown into the bobbin reservoir **R2**.

The bobbin loader **R1***a* operates in response to a bobbin requesting signal from any one of the spinning frames Si which belong to the first group and can thus supply a bobbin from within the bobbin reservoir **R1** to the spinning frame Si by way of the corresponding bucket conveyor **72***a*, transfer conveyor **72***b*, and sub transport path **73***c* or main transport path **73***a*. In particular, a bobbin which has been transferred from a bucket conveyor **72***a* to a corresponding transfer conveyor **72***b* is then transferred to the sub transfer path **73***c* by a corresponding change-over mechanism **72** at the location at which the transfer conveyor **72***b* crosses the sub transport path **73***c*, whereafter the bobbin is transferred to the main transport path **73***a* at the last end of the sub transport path **73***c*. Consequently, the bobbin can be sent into the bobbin receiving device SiR or SiL of the predetermined spinning frame Si by suitably operating one of the change-over mechanisms **72***ak*-**1** and **72***ak* (k=2i) corresponding to the predetermined spinning frame Si.

Similarly, a bobbin within the bobbin reservoir **R2** can be supplied to an arbitrary one of the spinning frames Si belonging to the second group by way of the corresponding bobbin loader **R2***a*, bucket conveyor **72***a*, transfer conveyor **72***b* and main transport path **73***a*. In this instance, a corresponding change-over mechanism **72***b***1** transfers the bobbin from the transfer conveyor **72***b* to the main transport path **73***a*.

In this instance, since there is no overlapping portion between bobbin supply routes to spinning frames Si and Sj ($1 \leqq i \leqq 6$, $7 \leqq j \leqq 16$) which belong to different groups from each other, they can receive supply of bobbins in a simultaneous relationship with each other.

When the type of yarns to be set on the spinning frames Si which belong to the first group is to be changed, new bobbins for use with a new type of yarns are prepared in the bobbin reservoir **R3** in advance, and then, upon changing over of the yarn type, bobbins of the new type can be supplied to the spinning frames Si of the first group by way of the bobbin loader **R3***a*, transfer conveyor **72***b*, spare sub transport path **73***d* and main transport path **73***a*. Supply of bobbins of a new type to the spinning frames Si belonging to the second group takes place in a similar manner, and new bobbins prepared in the bobbin reservoir **R4** may be supplied by way of the spare main transport path **73***b*.

Subsequently, such a case will be examined that some of the spinning frames **S7**, **S8**, . . . , **S10** which belong to the common machine group **G12** are to be changed from the second group to the first group. In this instance, bobbins for use with the first group should be supplied in place of bobbins for use with the second group in response to a bobbin requesting signal from a spinning frame Sk which should be changed from the second group to the first group. In particular, if it is assumed that the two spinning frames **S7** and **S8** are to be changed from the second group to the first group, then a bobbin for use with the first group which is accommodated in either one of the bobbin reservoirs **R1** and **R3** is transported to the main transport path **73***a* by way of the sub transport path **73***c* or spare sub transport path **73***d* and the communicating transport path **73***d* or spare communicating transport path **73***f* corresponding to the spinning frame **S8**. Consequently, the position at which the sub transport path **73***c* or spare sub transport path **73***d* joins the main transport path **73***a* can be substantially changed to a position on the upstream side very near to the spinning frame **S8**. Accordingly, the spinning frames **S7** and **S8** can be thereafter treated as they belong to the first group. In this instance, however, since the communicating transport path **73***e* and spare communicating transport path **73***f* corresponding to the spinning frame **8** are used, flows of bobbins on the sub transport path **73***c* and spare sub transport path **73***d* should be changed over by the change-over mechanisms **73***c***2** and **73***d***2** corresponding to such transport paths **73***e* and **73***f*.

Since this can be realized in a quite similar manner with all of the spinning frames Si (i=7, 8, . . . , 10) which belong to the common machine group **G12**, the spinning frames **S7** to **S10** can be divided into two groups individually including arbitrary numbers of spinning frames in accordance with required production lot amounts for individual types of yarns so that they may individually belong to either one of the first and second groups. Accordingly, the boundary between the first and second groups can be selected arbitrarily.

While the sub transport path may be constructed so that it may supply at least two types of bobbin as described above, where a spare sub transport path is provided in a juxtaposed relationship and extends to a position at which the sub transport path joins the main transport path and also the communicating transport paths are provided with spare communicating transport paths accordingly, new bobbins which are to be supplied after changing over can be transported onto the spare sub transport path in advance. Consequently, when the type of bobbins is to be changed over, the time required for supply of bobbins can be reduced.

Other Embodiments

It is a matter of course that the system shown in FIG. 2 may include an arbitrary total number of spinning frames Si and each of the first and second dedicated machine groups G1 and G2 and the common machine group G12 may include an arbitrary number of spinning frames Si. However, the sub transport path 73*c* and the spare sub transport path 73*d* should join the main transport path 73*a* on the upstream side very close to a most upstream side one of the spinning frames Si which belong to the first dedicated machine group G1 while the communicating transport paths 73*e* and the spare communicating paths 73*f* should be provided for all of the spinning frames Si which belong to the common machine group G12.

The spinning frames Si may be divided into three dedicated machine groups G1, G2 and G3 and two common machine groups G12 and G13 as shown in FIG. 3. In this instance, two sub transport paths 73*c* and 73*g* and two spare rib transport paths 73*d* and 73*h* should be provided for supplying bobbins to the dedicated machine groups G1 and G2 except the dedicated machine group G3 on the most upstream side while communicating transport paths 73*e* and 73*m* and spare communicating transport paths 73*f* and 73*n* should be provided for the individual spinning frames Si which belong to the common machine groups G12 and G23, respectively.

Further, the present embodiment can be accommodated for expansion to an arbitrary number of dedicated machine groups G1, G2, . . . and common machine groups G12, G23, . . .

Further, in each of the embodiments described above, the spare main transport path 73*b* and the spare sub transport path 73*d* can be omitted as shown in FIG. 4. In particular, referring to FIG. 4, the main transport path 73*a* and the sub transport path 73*c* may be connected in a branching manner at the starting ends thereof to the bobbin reservoirs R2 and R4 and the bobbin reservoirs R1 and R3, respectively, in preparation for changing of a type of a yarn for a spinning frame Si. It is to be noted that each of the main transport path 73*a* and the sub transport path 73*c* must only be constructed generally such that at least it can alternatively supply two different types of bobbins including bobbins in use at present and bobbins to be used anew, and upon changing to a new type of yarns, old bobbins in a bobbin reservoir Rj should be replaced by new bobbins. However, where the main transport path 73*a* and the sub transport path 73*c* are constructed such that each of them can supply three or more types of bobbins, then the opportunities for such replacing operation of bobbins are reduced, allowing more convenient use of the bobbin supply system.

What is claimed is:

1. A bobbin supply system for spinning frames for supplying a plurality of types of bobbins in a set manner to a plurality of spinning frames, wherein said spinning frames are divided into a plurality of dedicated machine groups each for working yarns of a fixed type and a common machine group disposed between each adjacent ones of said dedicated machine groups for working yarns of a selected one or ones of different types, wherein said system comprises a main transport path capable of supplying bobbins to all of said dedicated machine groups and the common machine group or groups from an upstream side of said main transport path toward a downstream side of said main transport path, a sub transport path joined to said main transport path at a boundary position between each of the common machine group or groups and an adjacent one of said dedicated machine groups on a downstream side of the common machine group for supplying bobbins to the spinning frames on a downstream side of the boundary position, and a communicating transport path provided for each of the spinning frames of the common machine group or machine groups adjacent the boundary position or positions for establishing communication between said sub transport path and said main transport path.

2. A bobbin supply system for spinning frames according to claim 1, wherein said spinning frames are divided into more than two dedicated machine groups and more than one machine group, and said main transport path and said sub transport path are constructed such that they are capable of supplying more than two different types of bobbins.

3. A bobbin supply system for spinning frames according to claim 1 or 2, wherein said main transport path includes a change-over mechanism provided for each of said spinning frames for changing over between supply and stopping of supply of bobbins to the spinning frame.

4. A bobbin supply system for spinning frames according to claim 3, wherein each of said spinning frames include a pair of opposing spindles on right- and left-hand sides of each of said spinning frames, and the change-over mechanism is disposed on each of the right- and left-hand sides of each of said spinning frames.

5. A bobbin supply system for spinning frames according to claim 1, wherein a spare sub transport path is provided in a juxtaposed parallel relationship to said sub transport path, and spare communicating transport paths for establishing communication between said spare sub transport path and said main transport path are disposed in parallel to the communicating transport paths.

6. A bobbin supply system for spinning frames according to claim 5, wherein branching positions are provided between said spare sub transport path and each of said spare communicating transport paths, and a change-over mechanism is provided at each of said branching positions.

7. A bobbin supply system for spinning frames according to claim 1, comprising:

bobbin reservoirs for temporarily storing different types of bobbins; and

connecting conveyors for connecting said main transport path and said sub transport path to said bobbin reservoirs.

8. A bobbin supply system for spinning frames according to claim 1, wherein branching positions are provided between said sub transport path and each of said communicating transport paths, and a change-over mechanism is provided at each of said branching positions.

* * * * *